Urethral strictures

Urethral stricture = scarring of corpus spongiosum and overlying urothelium

Occurs in anterior urethra only: posterior urethral 'strictures' more correctly referred to as either distraction defects (after pelvic #), or contractures (prostate/BN)

Normal urethral diameter 30F

Eccentric (dorsal) placement of bulbar urethra within corpus spongiosum.

C. spongiosum (urethra) has dual blood supply – antegrade artery to the bulb (internal pudendal) and retrograde dorsal penile artery

Aetiology

- Traumatic
  - Straddle injury
  - Perineal trauma
  - Urethral instrumentation
- Inflammatory
  - BXO
- Infective
  - Gonococcus, chlamydia

Presentation

- Asymptomatic
- Obstructed voiding
- UTI
- Prostatitis
- Impaired ejaculation
- Rarely acute urinary retention

Evaluation

- **Crucial to determine the length, location, depth, and density**
- Endoscopy
- Ascending and descending urethrography
- ? USS for depth of fibrosis (underestimates degree of fibrosis)
- Operative bouginage (distal and proximal with Fogarty catheter)

Management

Reconstructive ladder considered outdated

Internal urethrotomy appropriate for primary management of short bulbar urethral strictures; urethroplasty should be considered as primary managment for all others

(i) Dilatation

- Canny-Ryalls or Cluttons
- Stretch stricture without tearing – frequently forgotton
- Ideally sequential catheters over period of weeks
- Equally effective as optical urethrotomy provided done carefully to avoid tearing urethral mucosa (Steenkamp 1997)

(ii) Internal urethrotomy

- 30-40% overall success rate
- 74% overall success rate for short (<1.5cm) bulbar urethral strictures a/w minimal spongiofibrosis (Pansadoro 1996); ~ 50% of all short bulbar urethral strictures cured by first urethrotomy

Poor results for non-bulbar and multiple strictures; Overall 32% success rate for anterior urethral strictures at 98 months (Pansadoro 1996)

Maintaining urethral patency

- 3-7 days urethral catheterisation equivalent to 6 weeks
- Urethral patency can be maintained by urethral dilatation, but this needs to be performed long-term (> 12 months); stricture typically returns after cessation of ISD
- No role for urethral stents – success rates and satisfaction levels at 10 yrs very low (~20-30%); also can migrate, cause perineal pain and difficult to remove (absolutely contraindicated in non-bulbar urethral strictures and after substitution urethroplasty using skin islands)

Recurrent strictures

- Repeat internal urethrotomy a/w poor outcome (~ 6% cure)
- Urethroplasty recommended in patients fit enough (physically and mentally)

Role of laser urethrotomy undefined

(ii) <u>Anastomotic urethroplasty</u> (excision and primary anastomosis)

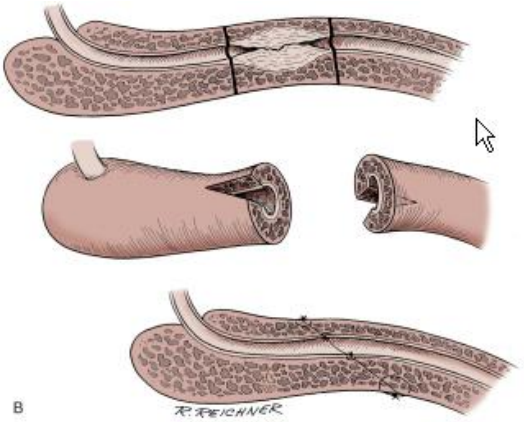
Most reliable method

Ideal for bulbar strictures < 2cm

Not suitable for penile strictures as unacceptable rates of chordee

4 elements: excision, mobilisation, spatulation, anastomosis

Crucial to observe good tissue handling techniques, preventing ischaemia and allowing a tension-free anastomosis



A number of steps may be employed to adequately bridge defect without introducing tension and subsequent chordee (4):

(i) Distal mobilisation o suspensory ligament of penis (2-3cm)
(ii) Separation of proximal corporal bodies
(iii) Inferior pubic osteotomy
(iv) Re-routing of urethra around lateral corporal body

(iii) <u>Substitution urethroplasty</u> (incision/excision and tissue transfer)

May utilise graft or flap [grafts derive blood supply from new site – imbibition and inosculation; flaps take blood supply from donor site]

Grafts (4) Skin (full thickness or partial thickness)
Buccal mucosa
Bladder mucosa (largely historical)

Rectal mucosa (historical)
Either one-stage onlay technique (ventral,lateral or dorsal) or two-stage (excision, onlay graft & second-stage tubularisation – Shreiter and Noll)

Flaps — Penile or de-epithelialised scrotal skin, raised on dartos fascia of penis or scrotum

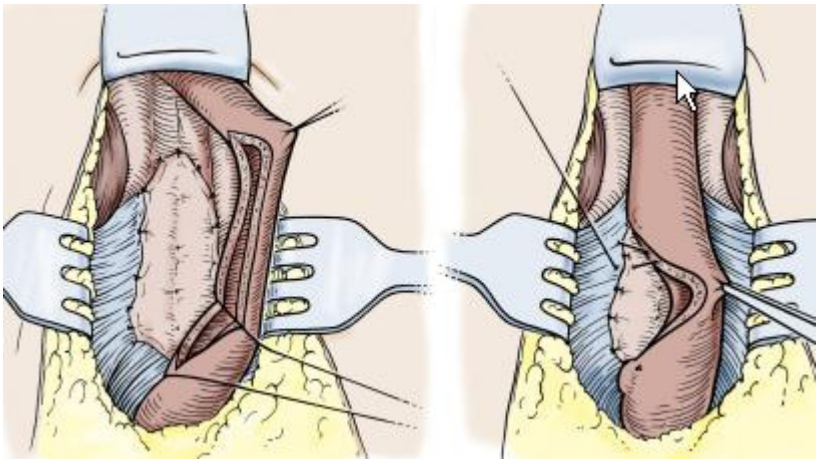
Grafts much easier to perform and suited to proximal anterior urethra; flaps difficult but good for distal urethra.
For both grafts and flaps,onlay techniques better than tubularisation
High rates of recurrence folowing use of skin for BXO strictures (known as Koebner phenomenon) – potentially improved results with buccal mucosa grafts, which is resistant to BXO
Typically

Bulbar stricture	Dorsal onlay buccal mucosa graft
Penile stricture	
BXO	Two-stage buccal mucosa graft*
Non-BXO	Flap (Orandi) or graft
Hypospadias	Flap or two-stage post-auricular (Wolfe)

* Two-stage procedures reduce recurrence rate c.f single stage tubed graft, but revision rate higher

<u>Dorsal onlay buccal mucosa graft</u> (Barbagli 1995)

Reliable technique, esp for bulbar urethral strictures
Inner cheeks (~6cm) and lower lip donor sites
Dorsal urethral incision, application of buccal mucosa to ventral tissue (corpus cavernosum or triangular ligament)
Excellent results (see below)
Standard ETT satisfactory for buccal harvesting; infiltration with adrenaline and lignocaine.
Consent for



<u>Outcomes</u>
Anastomotic urethroplasty much more reliable than substitution urethroplasty
Recurrence rates:

	<u>3 yrs</u>	<u>10 yrs</u>	
Anastomotic urethroplasty	90%	90%	
Substitution urethroplasty	95%	60%	(5% per year attrition rate)

	Anastamotic urethroplasty	Substitution urethroplasty (Pedicled foreskin)	Substitution urethroplasty (Buccal mucosa)
5 year recurrence rate	12%	21%	4% at 38 months for dorsally placed graft 15% at 37 months for ventrally placed graft 19% at 37 months for tubed graft
10 year recurrence rate	13%	31%	
15 year recurrence rate	14%	58%	
Complication rate	7%	33%	NR
Complications	NR	Erectile dysfunction Post void dribble Palpable or visible pouch UTI Fistula Chordee	NR

Andrich 2003 and Bhargava 2004

Appendix

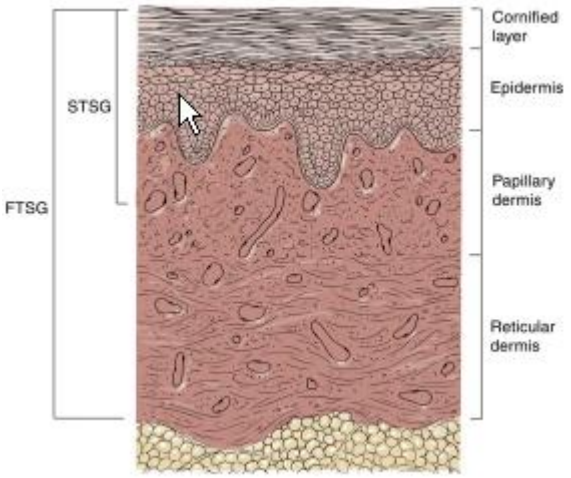
Grafts and flaps

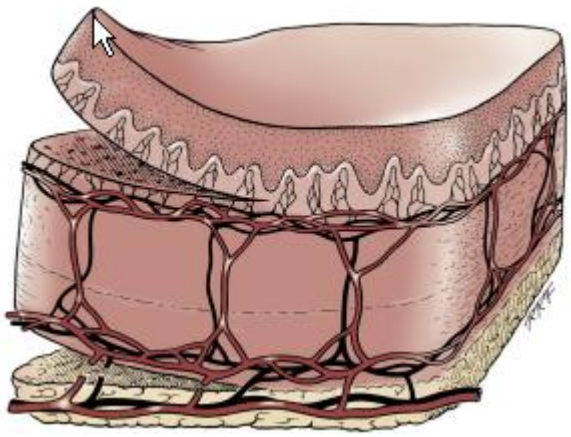
Graft 'tissue excised from a donor site which re-establishes its blood supply by revascularisation'
Process by which revascularisation occurs = 'take'
Take = 3 to 4 days
2 processes – imbibition and inosculation
Imbibition
- 48 hours
- Graft survives by 'drinking' nutrients from host bed
- Graft temperature lower than host temperature

Inosculation
- 48 hours
- Development of true circulation
- Graft temperature rises to that of host

Features affecting 'take'
- Graft type (see below)
- Donor site vascularity (tendon, smoking, PVD etc.)
- Infection
- Movement

Grafts





Superficial plexus aka intradermal plexus – lies below epidermis in papillary dermis
Subdermal plexus lies at interface between skin and subcutaneous fascia.
Subdermis has high collagen and lymphatic content but fewer larger vessels – therefore elasticity maintained (less likely to shrink) but less favourable vascular characteristics

Split skin graft
- Epidermis only
- Favourable vascular characteristics
- More likely to shrink and be brittle

Full thickness skin graft
- More durable
- Less favourable vascular characteristics

Bladder mucosa
- Superficial and deep plexi but much more cross communication

Buccal mucosa*
- True panlaminar vascular plexus
- Thought to be ideal graft

Flap
- The term flap implies that the tissue is excised and transferred with the blood supply either preserved or surgically re-established at the recipient site
- May be cuticular, fasciocutaneous or musculocutaneous based on location of defined vascular supply

<u>* Advantages of buccal mucosa</u>
Easy to harvest
Easy to handle
Thaick
Panlaminar vascular plexus – good take
Waterproof
Antibacterial
Resists skin diseases

<u>Harvesting buccal mucosa</u>
Normal intubation OK vs. nasal intubation
Avoid Stensen's duct opposite second upper molar
Mark excision site
0.5% lignocaine and adrenaline
Tenotomy scissors (superficial vs. deep)
2cm wide, at least 1cm from vermillion border
Side effects worse for closure vs. secondary intention (Mundy J Urol 2004)
Lignocaine lozenges

<u>Reconstructive ladder for urethral strictures</u>
Urethral dilatation
Optical urethrotomy
Urethroplasty
- Anastomotic urethroplasty
- Substitution urethroplasty
  - Graft
    - One-stage
    - Two-stage
  - Flap
    - Local rotation flap (Orandi)

Urethral stent
- Urolume
- Memokath